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ABSTRACT

A study determined the effectiveness of using a computer word processor as compared to the traditional paper-and-pencil method for process story writing. Students in a first-grade classroom in the Mark Gardiner Hoyle Elementary School located in Swansea, Massachusetts, were randomly divided into a control group of 12 students and an experimental group of 11 students. All students completed a pretest story using paper and pencil. Students then wrote eight stories (correlated with curriculum and/or thematic units) using word processing software or paper and pencil. All stories were evaluated by the classroom teacher and the school principal (a former classroom teacher). Results indicated that: (1) the experimental group scored significantly higher on the pretest story than the control group; (2) all students showed growth in their story writing abilities as the school year progressed; (3) the experimental group scored significantly higher than the control group on five of the eight stories as well as the posttest story; but (4) the pretest scores accounted for most of the variance in scores. Findings suggest that students who used the computer and word processing software for story writing scored higher and wrote longer stories with more detail than the students who used paper and pencil. (Contains 53 references, 11 tables, and 1 figure of data. Appendixes present the parent permission letter, the story evaluation sheet, story topics, and a list of retrospective pretest questions asked of students.) (RS)

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ED 384 882

Comparison of First Grade Computer Assisted and Handwritten Process Story Writing

BY

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Submitted in Partial Fulfillment of the Requirements
for Degree in Master of Education in
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CHAPTER I

THE PROBLEM

Introduction

Prior to the 1980s, the elementary writing curriculum was not considered a significant component of the whole elementary curriculum. Shaw (1985) states that the curriculum guidelines did not designate a certain amount of time for writing within the elementary curriculum as compared to other core subjects within the elementary curriculum (Ferrara, 1990). Writing was considered a task to be completed with any additional time teachers may have during the course of their teaching.

Ferrara (1990) also refers to Beeker (1981) when she discusses how elementary teachers "taught" writing during this time. She indicates that the teachers "taught" writing by giving a story starter to the students and assigning them to complete their story within a certain amount of time. No interaction between the teacher and the students would take place during this time.

Ferrara (1990) further cites Hoskisson and Tompkins (1987) when they tell about the students being required to write a single written product within a certain period of time. There was no interaction between the teacher and the students and consequently the students did not truly learn how to write. These researchers further suggested that these students only practiced writing. Traditionally, the entire elementary writing curriculum has been considered an academic exercise with the evaluation based solely upon the final product.

The elementary writing curriculum began to take a new direction during the 1980s. Ferrara (1990) states "We adapted our way of thinking as we looked at people instead of paper and the producer as well as the product." She refers to Bruneau (1989), a teacher, who explains how some teachers felt compelled to attempt a change in the curriculum due to their aversion to the elementary writing curriculum. These teachers felt they wanted to try a less structured, holistic approach, which truly emphasizes and focuses on the students' employment of their senses.

Ferrara (1990) again cites Beeker (1981) when she states the one critical incident that changed the direction for the elementary writing curriculum. She refers to the Ford Foundation, which in 1978 published a paper written by Donald Graves. Graves (1978) called for the teachers to use a process approach to writing which was a complete change in pedagogical approaches to the elementary writing curriculum.

Since the 1980s, educators have looked upon the area of writing as a developmental process rather than just the one final product. This is referred to as process writing (Ferrara, 1990) and is defined as the stages that students would go through when writing, namely, prewriting (brainstorming), writing, revising, and publishing. The teacher's role in process writing is to work with the students during the writing and offer guidance and recommendations as appropriate.

Piaget's belief is that the teacher's role is to facilitate the students in their learning (Pulaski, 1971). This is what the literature states that the teacher's role is during process writing. Piaget's cognitive developmental theory is also applicable here

as the students must be developmentally ready for true learning to occur (Ornstein & Levine, 1989).

First graders, at a certain time in the school year possess some level of development with writing, and should be termed emergent or beginning writers (Cochran-Smith, 1991). They can form letters, know the sound-letter associations, and can recognize some words. First graders are at the developmental stage of bringing concreteness to abstract thoughts and ideas. Also, they are quite anxious and enthusiastic about writing and expressing their thoughts on paper (Guddemi & Fite, 1991).

Computers are infiltrating our society and also are now being integrated into the elementary schools (Rodgers, 1991). These are becoming an integral part of everyday life and should not be perceived as a novelty. Computers are looked upon as a tool to enhance learning as they lend themselves beautifully to meet individual student needs, as well as their ability to be integrated into many subject areas. The computer can be perceived as a tremendous tool and asset to enhance the students' academic development. At the

very least, it should be looked upon as a motivational tool, especially at the first grade level. Therefore, decisions need to be made as to the role computers should take within the elementary curriculum as this may necessitate curriculum restructuring and modifications (Rodgers, 1991).

The National Assessment of Educational Progress (NAEP) report (1994) based on students' writing in grades 4, 8, and 11 from 1984-1992 indicates that, with the exception of grade 8, there has been no major improvement in students' writing since 1984. This is based on the four national assessments of writing performance which were administered during the years 1984, 1988, 1990, and 1992. The last assessment also included tasks that had been previously given during the other three years. Also, the students were given tasks in three areas of writing, namely informative, persuasive, and imaginative to complete.

Process writing should be an important area within the curriculum (Ferrara, 1990) and educators should look at the computer as a word processor to see if it will enhance the students' writing. This would be one

method of incorporating the computer into the curriculum. Writing research has been conducted in this area at various grade levels (Martin, 1994; Butler & Cox, 1990; Neuwirth, Haas, & Hayes, 1990; Olson & Johnston, 1989; Dalton, Morocco, & Neale, 1988; Cheever, 1987; Whitmer & Miller, 1987; Murray, Lines, & Sprumont, 1986). However, the first grade studies conducted in writing were in conjunction with other first grade curriculum issues and subjects.

Writing is an integral component of the curriculum and it is a skill that students must master in order to meet the demands of society. Its importance is stated in the Report on Education Research. Michael Guerra (1994) a member of the National Assessment Governing Board states that: "Even with the rise of computers and videos and fiber-optic data highways, writing remains central to communication. When that's garbled or tortured...communication is poor, no matter how advanced the technology."

Statement of the Problem

The purpose of this research is to attempt to determine the effectiveness of word processing on process story writing in grade one. The research will focus on one first grade classroom in which the students have been randomly divided into two groups. The control group will consist of students using the traditional paper and pencil method for process story writing and the experimental group will use the computer as a word processor for their stories. All of the students will write a story as a pre-test using paper and pencil, and the control group will write post-test stories using pencil and paper, whereas the experimental group will use the computer word processor.

Purpose of the Study

Writing, and now more especially process writing, is an integral component of the elementary curriculum (Ferrara, 1990; Mehlville R-9 School District, 1983; Merrimack School District, 1986). If there is a tool

available that can enhance and improve this area for students, then educators would be remiss if this is not incorporated into the curriculum methods.

Research needs to be conducted in this area as there appears to be a void in the literature regarding the effects of using the word processor for story writing by first graders.

Justification for the Study

Technology continues to infiltrate its way into society and is now emerging into the schools (Rodgers, 1991). Therefore, its effectiveness within the schools must be evaluated. The primary place for this to occur is in the classrooms with the teachers as the classroom researchers. They are the ones with first hand knowledge of curriculum modifications that are needed to enhance the educational setting. Teachers want their students to succeed. They need to be an active voice in determining the proper educational decisions that will foster improved learning (Olson, 1990). If it is shown that technology can enhance students' academic achievement, then it should become mandatory

for the school departments to foster technology's use (Wachob, 1993; Tolman & Allred, 1991). This information can assist school departments in determining and justifying expenditures on technology and its use in the curriculum.

Assumptions

This research was conducted with the following assumptions included:

1) One first grade classroom was randomly divided into the two groups for this study.

2) All of the students were given the same keyboarding instruction prior to this research.

3) All of the students were given the same instruction to the word processing software The Children's Writing and Publishing Center (The Learning Company, 1990). This is the word processing software used by the experimental group.

4) All of the story topics used in this study correlated with the curriculum or thematic units being taught within the class.

5) The prewriting (brainstorming) stage of process writing was completed as a class activity in conjunction with the curriculum or thematic unit lessons.

Hypothesis

The following hypothesis was developed for this study:

There is no significant difference in the final story post test evaluation between students in grade one being taught process story writing using the computer as a word processor and students being taught process writing using the traditional paper and pencil method.

Limitations of the Study

This research was limited as the researcher was incapable of controlling the following variables:

1) The computer anxiety that the experimental group may experience using the computer in this study.

2) The students' access to computers, both at home and outside of school, that could effect their computer skills.

3) The sample chosen was one first grade classroom at the Mark G. Hoyle Elementary School which is equipped with four networked IBM computers and one printer. This may not be representative of other first grade classrooms.

Definition of Terms

In order to ascertain an accurate understanding of this research, the following terms are defined and offered:

Control group: The randomly selected group of first graders using the traditional paper and pencil method to write their stories.

Experimental group: The randomly selected group of first graders using the computer as a word processor to write their stories.

Process writing: This refers to the stages that a student would undergo when writing a story, namely,

prewriting or brainstorming, writing, revising or editing, and publishing.

Software for word processing: The Children's Writing and Publishing Center (The Learning Company, 1990) is the word processing software program used by the experimental group.

Story: This refers to the written product, composed by the students with guidance from the classroom teacher, on topics relating to the curriculum being presented.

Thematic writing approach: This refers to having students write stories based upon thematic units being presented within the classroom which integrates the core subjects.

Word processor: This refers to when the students use the computer as a writing tool to assist in alleviating the sometimes difficult tasks associated with process writing.

Outline of the Thesis

This thesis is presented in the following format:

Chapter I includes the Introduction, Statement of the Problem, Purpose of the Study, Justification for the Study, Assumptions, Hypothesis, Limitations of the Study, Definition of Terms, and Outline of the Thesis.

Chapter II contains a Review of the Related Literature.

Chapter III consists of the methods and procedures used in obtaining and analyzing the data. More specifically, it contains an overview, description of the research method, research design, selection of the subjects, classroom procedures, instrumentation, data collection and recording, and data analysis.

Chapter IV includes the data and statistical analysis employed in evaluating the data and testing the hypothesis.

Chapter V contains the summary, discussion, and recommendations.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

The purpose of this chapter is to review prior studies in the areas of computers in writing education, especially in first grade English curriculum. Also this review focuses on content specifically aimed at writing and process writing, and related studies of process writing and word processing conducted at different grade levels. This review should assist in providing important information regarding the effectiveness of using the computer as a word processor for process writing in a grade one classroom.

Related Literature

The Merrimack School District developed a curriculum guide, Language Arts Curriculum Guide (1986), for teachers of all grades to follow. The philosophy behind the writing aspect of this guide is stated in part as follows: "Writing is a craft which

allows the student to manipulate language to convey his attitudes, intentions, perceptions and knowledge. For this reason it is important that he be competent in this area" (Merrimack School District, 1986).

They also term an elementary global curriculum for language arts which is comparable to a scope and sequence outline. The first grade skills required to be taught as stated in this curriculum include sentence writing and structure, grammar, punctuation, capitalization, parts of speech, spelling, and handwriting.

The New York City Board of Education created a curriculum guide for their first grade teachers to follow. The guide, Now We Are Six: A Guide to Teaching First Grade (1984), includes information on the importance of computers within the curriculum, a scope and sequence for all curriculum areas including writing, and the importance of themes of study within the curriculum.

Included in this guide are the following statements regarding the importance of the computers within a first grade classroom: "The potential for

using computers in first grade classrooms is as limitless as a child's imagination. Computers are tools--another way to expand children's learning and to fire their imaginations" (New York City Board of Education, 1984).

In addition, the first grade curriculum must be one that the students can relate to and understand. It must be interesting in order to hold their attention as well. As the New York Board of Education states: "Learning is not an isolated process, and the thematic approach to curriculum development provides for the integration of content areas and skills" (1984).

They recommend that the following standards be examined when choosing themes:

-It is relevant to the interest and needs of the children.
-It is age and/or developmentally appropriate.
-It will foster the development of skills.
-It is valid in that the learned concepts, skills, and attitudes may be applied to real life.
-It allows for integrating the content areas.
-It can be studied more deeply by reference to a

variety of books, materials, and other resources.

-It emphasizes people, their interdependence, and the significant aspects of their environment.

-It is as exciting and interesting to the teacher as it is to the children.

-It evolves from the first grade curriculum (New York City Board of Education, 1984).

Also included in this guide is a checklist of skills for beginning writing in the first grade. These skills, which should be on-going throughout the entire year, are as follows:

-Associating oral language with print

-Inventing symbols to carry messages

-Experimenting with letter shapes

-Using invented spelling to write new words

-Writing own stories

-Writing sentences using known words

-Copying letters and words

-Establishing line-to-line progression

-Using spaces between words

-Writing lists of recognizable letters and words

-Using appropriate punctuation

-Writing simple poems

-Creating new endings for stories

-Writing invitations, announcements, and simple letters using correct format

-Repeated writing of known words

-Showing pride in their growing mastery

-Enjoying rereading written work to others

-Taking pleasure in writing original stories, poems, songs (New York City Board of Education, 1984).

The focus should be on the content of the writing with the mechanics and handwriting being secondary. Today, this is termed process writing and is what educators are now consciously focusing on within the curriculum.

The Mehlville R-9 School District Teaching Staff and Curriculum Office created an elementary school curriculum guide for language arts teachers identified as Language Arts through Language Experience: An Elementary Curriculum Guide(1983). This guide specifically addresses the importance of the integration of process writing within the curriculum.

It states:

> Children learn writing by writing. They need many opportunities to write. Abundant, purposeful practice insures effective written expression. Writing is a process rather than a product. It involves creative and critical thinking at every stage. Teachers can effectively teach to the stages--prewriting, composing, revision, and editorial proofreading--through which a piece of writing develops (Mehlville R-9 School District, 1983).

The Chicago Board of Education also provided their teachers with a curriculum guide entitled Curriculum Guide in Communication Arts for the Elementary School in Listening, Speaking, and Writing, Grade 1, Levels CD (1981). Included in this guide are the objectives for the fundamental skills for writing appropriate for this grade level. Among these include grammar, capitalization, punctuation, sentence structure, and spelling. Also included are the objectives for students to write short stories based upon a given

topic, perhaps as a culminating activity to a particular lesson or theme.

The textbook, Houghton Mifflin English Level 1 (1988), which is used within the first grade curriculum of the Swansea Public Schools during the academic year 1994-95 also incorporates process writing and the grammar-writing connection (Haley-James, et al., 1988). The fundamentals of writing are also incorporated within this text and are components of the curriculum within this research study. Process writing is also a significant component of this text and is a part of the curriculum as well.

Butler and Cox (1990) conducted a study entitled Writing with a Microcomputer in Grade One A Study in Collaboration where Cox, the first grade teacher, had pledged her assurance of the utilization of the word processor for process writing within her classroom. However, as the two students wrote their story in collaboration, the teacher became more interested with the students' conversation. With the students' permission, the teacher tape recorded their next couple of writing assignments. The listening to the tapes

revealed how much tenacity the students endured during these assignments. Student conversations really evolved around many aspects of the written language. The authors based their evaluations of the students' conversations on Dickson's (1984) study to which they referred. They reiterate three categories of student conversation which include off-task, planning, and correction/discussion. Butler and Cox (1990) felt the need to add a fourth category, computer mechanics. They felt this addition was necessary in order to address the students' efforts required for successful operation of the word processor. While assessing the tapes, the authors were able to summarize that only 10% of the conversations were off-task. The other 90% was nearly equally divided among the three other categories. These tapes also revealed how much re-reading of the text is done during the writing process. Very rarely does this occur when students write with paper and pencil. This appears to be a completed task once the text is written on paper. The authors refer to a study by Phenix and Hannan (1984) which identified this same effect in their case studies of first graders writing with a computer. In addition, this study helps to

justify the inclusion of computers in class. As Butler and Cox (1990) state, "The lesson here is that this classroom was able to absorb the microcomputer into its existing structure in a way that enhances the achievement of the children."

Kuechle (1990), a Computer Coordinator, describes a first grade study of computers and writing in a learning center approach. The writing skills of the experimental group were noticeably far superior than the other classes by February of the same school year. The experimental group went to a computer lab four days per week for forty-five minute periods. Five learning stations were available for the students to utilize- three were computer stations (phonics, final consonants, and Logo; Kidwriter (Spinnaker Software Corp.); Magic Slate (Sunburst Communications) and two were non-computer stations (listening; writing). Teachers placed the significance of this approach on the fluency of the writing and not on the accuracy. In February, students from both the experimental and the other classes were asked to write the same story. The results were based on Kellogg-Hunt's method for analyzing children's writings which finds phrases that

can stand alone as sentences (T-units). The results showed that the experimental group had substantially higher T-units. The experimental group's stories were longer and more detailed containing more mature sentence quality with better spelling.

Neuwirth, Haas, & Hayes (1990) of Carnegie Mellon University conducted a three year study entitled Does Word Processing Improve Students' Writing? A Critical Appraisal and Assessment. The groups of the study were comprised of second semester freshmen and a group of experienced, published writers composed of teachers, graduate students, and professional writers.

The purpose of their study is to assess the cognitive effects of word processing on student writers. Also, they wanted to assist teachers in addressing curriculum design issues which develop when considering this integration. The three components of the writing process which were investigated through six studies include planning, reviewing, and revision. Their studies show that all of the writers used significantly less planning time when using the word processor as well as making only content type notes.

Writers using the traditional method utilized more planning time, also making a range of different types of notes throughout the process. Moreover, writers using the word processor did not gain "a sense of the text" during the writing. These writers felt that they needed printouts to help in this area. The group of expert writers made revisions that were far superior in quality than the students, and this had no correlation to the type of tool that was used. This shows that the use of the word processor alone cannot foster an improvement in the revision stage of process writing.

Some key points that were recognized through this study include the fact that planning is critical. There are also both positive and negative aspects to consider when using a word processor. Awareness of these factors can enhance the writing process. Also, teachers should realize that the most important factors with regard to writing are the goals, context, and knowledge and not necessarily word processing (Neuwirth, et al., 1990).

The researchers conclude that their study has educational implications some of which include writers use word processors in varied methods, curriculum

integration, and student guidance using the word processor. The technology alone cannot automatically improve the student's writing (Neuwirth, et al., 1990).

In summary, Neuwirth, et al.(1990), conclude that "teachers should take active steps to insure that their students learn to use word processing effectively in composing."

In another study to encourage literacy in Kindergarten and First Grade in Chicago Public Schools, Mavrogenes, Hagemann, and Wallace, (1987-1988) use Writing to Read (IBM), free writing, and written composition through whole language. Writing to Read (IBM) is a multisensory program developed by John Henry Martin for kindergarten and first grade students. The intention of this program is to have students learn to read through their writing. Three kindergarten groups from five schools and two first grade groups from four schools were selected for this study. Each group had 100 students for a total of 500 for the entire study.

Student assessment was measured with three methods. One method was through standardized tests.

Kindergarten students were measured on the word attack subtest of the Comprehensive Tests of Basic Skills, Form U, Level B. The first grade students were measured using the subtests of word analysis and reading comprehension of the Iowa Tests of Basic Skills, Form 7. Secondly, a spelling test was administered for assessment. Both the kindergarten and first grade students were given the same ten word spelling test for invented spelling. In addition, the first grade students were given another ten word spelling list in which the objective was to spell the words correctly. The last assessment method was collecting writing samples from all students. Students had to complete a story after being given the starter sentence.

Students using free writing, conducted only in Kindergarten, scored significantly higher ($p<.001$) than the other students in that grade in all four evaluation areas (encoding, content, word attack, and spelling). Kindergarten students learning with Writing to Read (IBM) scored higher in three of the areas (encoding ($p<.001$), word attack ($p<.001$), and spelling ($p<.01$)

and first graders using it scored higher in two (word analysis ($p<.001$) and invented spelling ($p<.05$) out of five areas. This study supports that although the computer was not used as a writing tool for free writing, teachers need to encourage creativity in their students when writing. Also the use of Writing to Read (IBM) on the computer enhanced the learning at these levels.

Another Kindergarten and First Grade study conducted during the academic year 1988-89 by Michigan University was entitled The Use of the Computer as a Writing Tool in Kindergarten and First Grade. Twenty-five kindergarten students and twenty-two first grade students were the sample subjects for this study. Michigan (1989) found that the computer was perceived as a tool for writing in both classes. The purpose of this study was to examine methods of improving the literary development at these age levels and to observe computer use and its relationship to literary development.

Students in Kindergarten used the graphic software Color Me (Mindscape) and word processor software Magic Slate (Sunburst Communications). These software

produced results which showed that through computer use the students exhibited more initiative toward process writing. Students also verbalized letter names more frequently due to the association of locating them on the keyboard as well as rereading the written text periodically.

First Grade students using just the word processor Magic Slate (Sunburst Communications) commented on the effectiveness of the computer for revisions as well as the aesthetic quality of the completed projects. They tended to work collaboratively on many of these assignments and preferred the computer to paper and pencil.

Although tentative conclusions could be based upon the students' reactions to the computer, the researchers still believe that more appropriate software still needs to be developed to effect quality growth at these grade levels.

Project CHILD (Computers Helping Instruction and Learning Development), a longitudinal study which began in 1987-89 in two schools and continued in 1990-92 in nine schools, looked at computer integration benefits for the entire curriculum. One of the key components

of the Project CHILD program is a classroom cluster consisting of multigrades. Three classrooms comprise a cluster with a primary cluster consisting of grades K-2 and an intermediate cluster consisting of grades 3-5. Each teacher within the cluster becomes a specialist in math, reading, or language arts. These teachers teach their particular content area to each of the three classes for one hour a day. During the remaining time the teachers have their own class for other content areas. By the academic year 1991-92 the sample size was approximately 5,400 students with an average class size of 25 students. For language arts, learning centers were conceived to assist the students in process writing. Through a variety of methods, purposes, and styles students wrote for a presumed time period each day.

Four areas were used for evaluation purposes. These included standardized test scores, retention, discipline referrals, and attendance. There was no significance found in the areas of retention, discipline referrals, and attendance. The standardized test scores compared were the reading subtest, math

subtest, and the total battery. The scores were analyzed first by comparing Project CHILD classes to non-Project CHILD classes by schools and grades. A second analysis was performed for the CHILD students who had been in the program for two or more years (long-term CHILD) in comparison to all CHILD students in the first analysis.

An effect size for each grade and school was calculated by subtracting mean scale scores of the non-CHILD students from those of the CHILD students and then the result was divided by the pooled standard deviation. The confidence interval (CI) was 95%.

"In these pooled analyses, a combined effect size whose confidence interval did not include zero was characterized as statistically significant. An effect size of .25 or more, with a CI that did not include zero, was considered educationally significant" (Kromhout and Butzin, 1993).

The results were positive and statistically significant for all grades and schools on all three subtest scores from the standardized tests. The CHILD group's effect size was +.09 for reading, +.16 for

math, and +.13 for total battery. Long-term CHILD students had even larger effects of +.12 for reading, +.22 for math, and +.20 for total battery. (Kromhout & Butzin, 1993).

Another study entitled The Effects of Writing on Reading Abilities: A Comparison of First Grade Writing Programs with and without Computer Technology during the academic year 1986-87 compared a classroom using Writing to Read (IBM) (which has been previously described in this chapter), an experimental writing class without technology, and a control class maintaining the normal curriculum. The sample consisted of 64 students, 21 in the Writing to Read (IBM) class, 21 in the writing class, and 22 in the control group.

The results, based on the SRA Survey of Basic Skills, Level 21 pretest and posttest scores, reflected that the amount of organized time allotted for writing may increase and improve students' reading abilities. The four reading subtests of the SRA Survey of Basic Skills, Level 21 include letters and sounds, listening comprehension, reading vocabulary, and reading comprehension. The Writing to Read (IBM) group

achieved statistical significance in reading comprehension ($p<.01$) and in the total reading score ($p<.05$). The researchers, Whitmer and Miller (1987) however, could not fully conclude that just structured writing time would have a direct impact on reading abilities through this study.

Martin (1994), a third grade teacher, speaks of the effect of using the word processing software The Children's Writing and Publishing Center (The Learning Company) for process writing within her integrated curriculum. She discusses how this enables her students to use developed writing skills and apply them to all other curriculum subjects. She states:

> "The computer has been a great facilitator in this process as it frees students from the drudgery of paper and pencil writing. What better testimony to the success of this program than the fact that my students now choose writing at the computer as their leisure time activity!" (1994).

Cheever (1987) conducted a study of seven fourth grade classes with the intent of determining what the effects of using a word processor are as composition

skills are attained. Her most significant finding through this research was "the teachers felt that word processing should be a part of the elementary composition curriculum." Significant findings were achieved in all measures based upon the quality and quantity of writing of the experimental group (which utilized the word processor Magic Slate (Sunburst Communications)). The students themselves reiterated their preference to using the word processor in this educational endeavor. She further states: "...that this research has captured evidence at just the beginning of a tremendous surge in educational technology. Through word processing, elementary children have the opportunity to achieve and excel in written communication" (Cheever, 1987).

Using the computer as a word processor does promote some debate. Some of these arguments were expressed by Thomas in a paper delivered at NCTE, 1985. These include that:

1) Word processing is difficult to learn and takes time away from writing instruction.

2) There are not enough computers currently in schools to make word processing a reality.

3) Computer utilization is difficult to incorporate into the traditional classroom setting.

4) Editing checkers may lead to the institutionalization of sterilized, impersonal writing styles.

5) Spelling checkers may produce a generation on nonspellers, the way calculators have reduced the ability to perform calculations.

6) The efficiency of editing aids will encourage students to focus on superficial writing features rather than on content.

7) Word processing requires keyboard skills, and there is not enough time to add this to our curriculum (Thomas, 1985).

Some fifth grade students and their teacher suggest some good reasons for word processor use on process writing. These include:

1) The computer was a motivational tool. It wasn't just another writing assignment it was another chance to use the computer.

2) Revising was easier, and the more students revised, the better their writing became.

Students found using the editing features of the word processor fun, rather than punishment.

3) Using the computer gave students experience working together, which helped their social relationships. Since students learned the word processing program as they went along, they enjoyed sharing the editing commands as they "discovered" them.

4) Students' writing was easier to read when they were sharing or evaluating. Reading each other's handwriting was no longer a problem; they could focus more on the writing ideas they were evaluating. (A side benefit was that students were reading and comprehending more.)

5) Their hands didn't get tired when writing and rewriting.

6) Using the printer made it easy to make multiple copies of their writing for peer sharing, revision and evaluation (Allen, 1986).

As Thomas (1985) states in her paper delivered at a NCTE conference: "Word processing is the best justification yet for using computers in our classrooms and in our curriculum."

Summary

Throughout the literature, some significant issues concerning the incorporation of the word processor for process writing within an elementary curriculum became quite common. These include:

1) Word processing must supplement writing, not replace it. The word processor should be perceived as a facilitator of the student's writing.

2) The teacher's role is critical to success in this educational endeavor.

3) Allowing time for planning appears to be critical to the task.

4) The time saved by using the word processor can be used for several revisions, thus leading to a higher level of writing or more work in other academic areas.

5) Peer collaboration in writing may be viewed as an asset.

6) Both reading and writing skills are enhanced.

7) Teachers need to receive administrative support and training.

8) Enough computers and printers need to be available for student and faculty use to be successful.

9) Students should have keyboarding lessons prior to using the word processor in order to facilitate this endeavor.

In addition, students' thoughts, ideas, and actions concerning the application of the word processor in their educational endeavors need to be considered. These include:

1) Students view the word processor as a motivational tool for process writing.

2) They are willing to take more of a risk when using the computer.

3) Students tend to write more using the computer.

4) With the ease of revision, they concentrate more on content.

5) The use of the word processor generates a high level of enthusiasm for writing.

6) The use of the word processor encourages more and easier revisions.

7) It saves time.

8) The aesthetic quality of the final product is appealing.

9) The monitor allows for easy reading and re-reading of the text.

Integrating word processing as an instrument for process writing could prove to be invaluable for students in all their endeavors. Educators should always keep in mind that: "It can be the goal of educators not to teach writing, not to teach computers, but to teach writing through the content areas using a computer" (Gunn, 1989).

CHAPTER III

Methods and Procedures

Introduction

The purpose of this chapter is to describe the methods and procedures that will be utilized in this particular study. This chapter is divided into the following sections:

1. Overview
2. Description of the Research Method
3. Research Design
4. Selection of the Subjects
5. Classroom Procedures
6. Instrumentation
7. Data Collection and Recording
8. Data Analysis.

Overview

This research study was conducted at the Mark Gardiner Hoyle Elementary School located in Swansea, Massachusetts. This school, which services grades Pre-School through five, opened in August, 1992 and has a

student population of approximately 290 students. Each classroom is equipped with four IBM networked computers and a printer. This study, which was conducted from January 3rd through March 3rd, 1995, took place in classroom 3.

Description of the Research Method

The general purpose of this study is to determine the effectiveness of using a computer word processor as compared to the traditional paper and pencil method for process story writing within a first grade classroom.

The entire class, which has an enrollment of 23 students, was randomly divided into the two groups. By randomly selecting the students, any problems with internal validity regarding this study is accounted for.

The basic intent of this study was to analyze the difference in the performance of two groups, the experimental group that utilized the computer as a word processor to write their stories, and the control group that used the traditional paper and pencil method to write their stories.

Research Design

Prior to the implementation of this research, a letter was sent to the parents of the students in this class (see Appendix A). This informational letter, which was signed by both the classroom teacher and the principal, was sent to alleviate any concerns that may arise with regard to their child's computer time.

The treatment for this study is the computer as a word processor for story writing. A control group time series design was used. The random selection of the students and the proper statistical analysis alleviated the potential of any threats that may have occurred by chance between the two groups.

The findings of this study cannot be generalized to all first graders as they all do not have access to the identical or equivalent computer environment that these students have. Additional factors such as computer experience and variations within the elementary curriculums also preclude this study from being generalized to all first graders.

All efforts have been made to ensure the internal and external validity by controlling the classroom setting, the administration of the networked computers and having addressed the Limitations stated in Chapter I.

The students were told by the teacher that eventually they would all use the computer and word processing software for story writing. It was explained that students using the computer first would write approximately 10 stories in order that they may become quite familiar with this method. After this, the other students would have their turn to write stories using the computer as a word processor. Through observation, there appears to be no negative impact in this consideration.

As explained in the Limitations in Chapter I, the entire class received instruction in both keyboarding and the use of The Children's Writing and Publishing Center (The Learning Company, 1990). In addition, the story topics correlated with the curriculum and/or thematic units presented within the class.

To help the students with keyboarding, they were each given two blank sheets of the computer keyboard,

one to keep in their desk and the other to keep at home at the beginning of the school year. The students completed these keyboard sheets during class lessons which helped them identify and understand their functions.

At this time the letter keys, the number keys, and the appropriate keys necessary for the successful operation of The Children's Writing and Publishing Center (The Learning Company, 1990) comprised the instructional focus. These include the shift key, enter key, backspace key, and the delete key. Also the three punctuation marks appropriate for first grade, namely the period, question mark, and exclamation mark were addressed. In addition to this, the incorporation of the software program Stickybear Typing (Optimum Resource, 1987) was added for practice.

The prewriting stage of process writing was completed as a class activity. This fosters ideas about the story assignment and reviews the curriculum and/or thematic unit lessons. The story is considered to be a part of the curriculum and/or thematic unit lessons. Any difficult vocabulary words associated with this prewriting (brainstorming) stage were written

on the blackboard during this activity. These words remained on the blackboard for the students to refer to.

The students were then told when they were going to write their stories. This gave them time to plan their thoughts and ideas in their minds before they wrote with their respective writing tools.

Selection of the Subjects

The class was randomly divided into two groups. Since the total enrollment in this class is 23, 12 students were randomly selected for the control group and 11 were randomly selected for the experimental group. There appeared to be, through observation, no dissension among the students as they were told which tool they were going to utilize to write their stories. They just accepted what was told them, knowing that they would certainly have the opportunity for story writing on the computer.

Instrumentation

The final story product was evaluated using the Evaluation Form (see Appendix B) by Mrs. M. D. Zagorski, Hoyle School Principal, and the classroom teacher. The addition of Mrs. Zagorski as an external evaluator brings more objectivity to the evaluations. A Likert-type scale was used for this form with 1=poor, 2=below average, 3=average, 4=above average, and 5=excellent. The pre-test story and the eight other stories were all evaluated in the same manner. (see Appendix B)

The first three criteria on the evaluation sheet measure the students' ability to express their thoughts and ideas in written form. The remaining five criteria evaluate the students' ability to apply the proper mechanics at the first grade level.

Classroom Procedures

Each of the stories written by the students correlated with the curriculum and/or thematic units being presented. The story is considered a daily work assignment and one of the culminating activities associated with the lessons.

The prewriting (brainstorming) stage of process writing was completed as a class activity in conjunction with the curriculum and/or thematic unit. This allowed for the students to foster ideas for their stories and to refer to any difficult and appropriate vocabulary words.

After this activity, the students would write their first draft independently thus having a better understanding of what the content of the story should contain. Students kept their stories in their desks until the next day when the classroom teacher listened to them individually read their stories. Through this activity, the students could identify revisions they wished to make. Among these include identifying omitted words, changing some of the text, sentences that needed structural revisions, capitalization,

punctuation, and some spelling errors. The students made revisions with the classroom teacher facilitating the activity.

The students were then instructed to begin the first revision. The experimental group retrieved their saved work on the computer and the control group began writing on a new piece of paper.

Only one revision was necessary most of the time. In rare cases some students needed to make a second revision to their story. By observation, the control group seemed to be making the most revisions as they would make errors in the copying stage. The student would always tell the classroom teacher which story was the final one.

Time constraints within the course of the day limited the total number of revisions after the first draft to two. For the most part, this did not become an issue, as the students were pleased with their first revision.

The stories were kept in manilla folders by the classroom teacher for their evaluations by Mrs. Zagorski and the classroom teacher.

Data Collection and Recording

Each story could receive a maximum total of 40 points. Each student received two sets of scores. (See Appendix B) One score was a tallied score which reflected Mrs. Zagorski's evaluation and the other score reflected the classroom teacher's evaluation. A mean score was calculated for the pretest ((score 1 + score 2)/2). The remaining stories were represented as a mean score (posttest).

A limitation that was mentioned in Chapter I and still must be considered refers to the actual computer skills of these students. To address this, a Retrospective pretest was asked of all 23 students by the classroom teacher. These questions include:

1. Do you have a computer at home?
2. Outside of school, do you practice keyboarding on a computer?
3. Outside of school, do you play games on a computer?

The results of this Retrospective pretest can be found in Chapter IV.

Data Analysis

The principle statistical tool employed in this study was Analysis of Covariance. The covariate selected was pretest scores of the experimental and control groups. The Analysis of Covariance procedure statistically equates both groups based on pretest scores, thus allowing for a fair measure for differences on posttest scores.

CHAPTER IV

Data Presentation and Analysis

This chapter presents the results of this research to ascertain the effectiveness of the use of the computer as a word processor for process story writing within a first grade classroom. The data presented will help establish the effectiveness of student process story writing abilities using the word processing software The Children's Writing and Publishing Center (The Learning Company, 1990) on IBM networked computers located within the first grade classroom. A total of 23 first graders (15 girls and 8 boys) participated in this study which occurred from January 3rd - March 3rd, 1995 at the Mark Gardiner Hoyle Elementary School in Swansea, Massachusetts.

All students wrote a pretest story using paper and pencil on the theme "Winter Fun". The evaluation of this pretest story was completed by Mrs. M. D. Zagorski, Hoyle School Principal, and the classroom teacher using the evaluation form found in Appendix B. Scores were calculated as a mean value of both evaluator's scores. A score of 40 represents a perfect

score based on this evaluation form. The grand mean for all students for this pretest story is 22.98. The standard deviation for the pretest story is 8.79. Table 1 summarizes this data.

Table 1

Pretest Grand Mean Score and Standard Deviation

Story	Grand Mean*	Standard Deviation
Winter Fun	22.98	8.79

*Grand Mean indicates both groups

Analysis of Variance was calculated for the pretest scores for both groups. The mean for the experimental group is 26.7273 and the standard deviation is 8.8356. The control group's mean is 19.5417 and the standard deviation is 7.5211. This data shows quite a difference in the pretest means. Both groups wrote a story on the same theme using paper and pencil. Moreover, the students were not aware of the fact that they would be divided into groups for purposes of this research. These scores suggest that

the students randomly selected for the experimental group came into this research with better writing skills than the students of the control group. This data is summarized in Table 2.

Table 2

ANOVA Pretest Means and Standard Deviations

	Mean	Standard Deviation
Experimental	26.7273	8.8356
Control	19.5417	7.5211

Analysis of Variance was also conducted for the pretest story by the two groups. This indicates that the F ratio is 4.4357 and p=.0474 which is statistically significant at the .05 level. The experimental group scored significantly higher than the control group on the pretest story in which both groups used paper and pencil. Table 3 displays those results.

Table 3

Pretest ANOVA for the experimental and control groups

	DF	Sum of Squares	Mean Squares	F Ratio	F Prob
Between groups	1	296.3281	296.3281	4.4357	.0474*
Within groups	21	1402.9110	66.8053		
Total	22	1699.2391			

*p<.05

The experimental group then wrote eight stories using a computer and the word processing software The Children's Writing and Publishing Center (The Learning Company, 1990). The control group wrote eight stories using paper and pencil. The grand means and standard deviations for these eight stories are presented in Table 4. As noted in Table 4 student progress of both groups was continual. Students started with scores of mean = 28.22 on the first story "Penguins" and progressed to mean = 37.39 by the end of this research.

Table 4

Grand Means and Standard Deviations for the eight stories

Story	Grand Mean*	Standard Deviation
Penguins	28.22	4.91
Animal Tracks	30.78	6.31
Hats	33.63	4.90
Soup	34.78	5.52
100 Dollars	34.83	4.74
Lost Tooth	35.57	4.81
Bears	36.04	3.50
Pain	37.39	4.54

*Grand Mean indicates both groups

The mean score and standard deviation for each story by group were also calculated and are summarized in Table 5. This illustrates that the experimental group scored significantly higher ($p<.05$) than the control group in five out of the eight stories (approximately 63%). The experimental group achieved a mean score of 30.82 on the first story and a mean score of 38.86 was attained for the last story. The control

group achieved a mean score of 25.83 on the first story and a mean of 36.04 was attained for the last story. By comparing the mean scores of both groups it appears that the experimental group achieved higher scores based on the evaluation form (see Appendix B) used for this research much quicker than the control group. This was quite evident to the evaluators during their assessment process. A substantial difference in the abilities of the students of the experimental group to apply some of the mechanics of writing appropriate for grade one, namely capitalization and punctuation, as compared to the control group was noted by the evaluators during their assessment process. Some of this can be attributed to the clear text on the computer monitor which helped enable the students to see where the capitalization and punctuation needed to be placed. The classroom teacher observed that the first story drafts that the students in the experimental group brought to the revision stage contained more accurate writing skills in relation to these two areas. It is also possible that some of these students had better skills in these areas as suggested by the pretest mean differences.

Table 5

Group Means and Standard Deviations Over Eight Stories

	Experimental		Control	
	Mean	Standard Deviation	Mean	Standard Deviation
Penguins	30.82*	4.21	25.83	4.38
Animal Tracks	32.55	6.91	29.17	5.50
Hats	36.23*	2.43	31.25	5.45
Soup	37.23*	2.08	32.54	6.76
100 Dollars	37.59*	3.22	32.29	4.58
Lost Tooth	38.23*	2.27	33.13	5.28
Bears	36.82	2.89	35.33	3.97
Rain	38.86	1.85	36.04	5.83

*p<.05 n=23 experimental=11; control=12

Posttest scores were calculated as a mean value of stories 1-8. Analysis of Variance was conducted for the posttest scores for both groups. The mean for the experimental group is 36.04 and 31.95 for the control group. The standard deviations are 1.8444 and 4.2590 respectively. Table 6 summarizes this data.

Table 6

ANOVA Posttest Means and Standard Deviations

	Mean	Standard Deviation
Experimental	36.04	1.8444
Control	31.95	4.2590

Analysis of Variance was also conducted for the posttest scores for the two groups. The posttest scores were calculated as a mean value of stories 1-8. This indicates that the F ratio is 8.640 and p=.008 which is statistically significant at the .01 level. This shows that the experimental group scored significantly higher than the control group when comparing the posttest scores. Table 7 summarizes these results.

Table 7

Posttest ANOVA for the experimental and control groups

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Main Effects	96.092	1	96.092	8.640	.008*
CLASS	96.092	1	96.092	8.640	.008*
Explained	96.092	1	96.092	8.640	.008*
Residual	233.548	21	11.121		
Total	329.640	22	14.984		

*p< .01

The following hypothesis was developed for this research:

There is no statistical difference in the final story posttest evaluation between students in grade one being taught process writing using the computer as a word processor and students being taught process writing using the traditional paper and pencil method.

Analysis of Covariance was the principle statistical tool used for analysis for this research as the pretest scores must be statistically equated. In

this study, the dependent variable is the posttest scores and the covariate is the score of the pretest. Analysis of Covariance adjusts the posttest scores on the basis of the covariate means and compares these adjusted means to ascertain if they are statistically significant (Huck, Cormier, & Bounds, 1974). Analysis of Covariance shows that the pretest scores account for most of the variance with an F ratio of 20.507 and p=.000. The experimental effect is 179.672 and the error is 149.967. Table 8 summarizes these results.

Table 8

ANCOVA of pretest and posttest scores for both groups

Source of Variation	Sum of Squares	DF	Mean Square	F	Signif of F
Covariate	153.772	1	153.772	20.507	.000
PRETEST	153.772	1	153.772	20.507	.000
Main Effects	25.900	1	25.900	3.454	.078
CLASS	25.900	1	25.900	3.454	.078
Explained	179.672	2	89.836	11.981	.000
Residual	149.967	20	7.498		
Total	329.640	22	14.984		

When the pretest was used as a covariate the Main Effects of Class (Experimental and Control) were not significant with an F ratio of 3.454 and p=.078.

As displayed in Table 8 the Main Effects of Class (either experimental-computer or control-pencil and paper) are non-significant (p=.078). With the pretest scores effect remove and statistically equatting both groups, posttest scores are non-significant. Pretest scores have explained a substantial portion of posttest differences (p=.000).

Based on the results of ANCOVA the null hypothesis developed for this study cannot be rejected as p=.078.

A Retrospective pretest comprised of three questions was asked orally of all 23 students regarding their actual computer skills. The three questions asked were:

1. Do you have a computer at home?
2. Outside of school, do you practice keyboarding on a computer?
3. Outside of school, do you play games on a computer?

The Chi Square results for Question 1 indicate that approximately one-half of the students(12 out of 23) have computers at home. Table 9 summarizes these results which are non-significant for Question 1 as p=0.537. The numbers are nearly equal for both groups (5 from experimental group and 7 from control group) for having a computer at home.

Table 9

Question 1: Do you have a computer at home?

	EXPERIMENTAL	CONTROL	TOTAL
NO	6	5	11
	26.1%	21.7%	47.8
YES	5	7	12
	21.7%	30.4%	52.2%
TOTAL	11	12	23
	47.8%	52.2%	100%

Chi Square = 0.381 with DF=1 p=0.537.

The second question was Outside of school, do you practice keyboarding on a computer? The Chi Square results indicate that slightly more than half of

the students do practice keyboarding outside of school. The results are almost equal for the experimental and control groups with 5 students from the experimental group practicing keyboarding outside of school and 7 students from the control group practicing keyboarding outside of school. Table 10 summarizes these results which are non-significant for Question 2 as p=0.510.

Table 10

Question 2: Outside of school, do you practice keyboarding on a computer?

	EXPERIMENTAL	CONTROL	TOTAL
NO	4*	6	10
	17.4%	26.1%	43.5%
YES	7	6	13
	30.4%	26.1%	56.6%
TOTAL	11	12	23
	47.8%	52.2%	100%

*Some expected values less than 5. Chi Square may not be valid. Chi Square = 0.434 with DF=1 p=0.510.

Question 3 was Outside of school, do you play games on a computer? These results show that the majority of the students (19 out of 23) do play games on a computer outside of school. The number of students from each group was nearly equal with 9 from the experimental group and 10 from the control group answering "Yes" to this question. Table 11 summarizes the Chi Square results which are non-significant for Question 3 as p=0.924.

Table 11

Question 3: Outside of school, do you play games on a computer?

	EXPERIMENTAL	CONTROL	TOTAL
NO	2*	2*	4
	8.7%	8.7%	17.4%
YES	9	10	19
	39.1%	43.5%	82.6%
TOTAL	11	12	23
	47.8%	52.2%	100%

*Some expected values less than 5. Chi Square may not be valid. Chi Square = 0.009 with DF=1 p=0.924.

CHAPTER V

SUMMARY, DISCUSSION AND RECOMMENDATIONS

Summary

The primary purpose of this study was to investigate the effectiveness of using a computer and the word processing software The Children's Writing and Publishing Center (The Learning Company, 1990) for process story writing within the first grade. Two groups were analyzed for differences. One group utilized the computer and the word processing software The Children's Writing and Publishing Center (The Learning Company, 1990) to write their stories. The other group utilized paper and pencil to write their stories. All of the students were given the same story assignments. The only differences were the tools utilized for the writing of the stories. Mrs. M. D. Zagorski, Hoyle School Principal, and the classroom teacher evaluated the pretest story and the subsequent eight stories by calculating story means. The evaluation form can be found in Appendix B. Posttest scores were calculated as a mean value of stories 1-8. One Way Analysis of Variance and Analysis of Covariance were the statistical tools applied to the data to determine if the differences in the scores of the stories and groups were statistically significant.

Mean scores and standard deviations were calculated for

One Way Analysis of Variance and Analysis of Covariance were the statistical tools applied to the data to determine if the differences in the scores of the stories and groups were statistically significant.

Mean scores and standard deviations were calculated for all of the stories for both groups. This data indicates that all students showed growth in their story writing abilities as this research progressed. Figure 1 (page 66) also illustrates this.

ANOVA reveals that the experimental group scored significantly higher ($p<.05$) on the pretest story in which both groups used paper and pencil to write their stories. In addition, the experimental group scored significantly higher ($p<.05$) on five out of the eight stories written on the computer word processor. Moreover, the experimental group scored significantly higher ($p<.01$) on ANOVA posttest scores.

However, when ANCOVA was used to analyze the data by equatting the scores, the results became non-significant ($p= .078$). The pretest scores account for most of the variance. The results of this study did, however, support what is presently in the literature concerning the use of the computer as a word processor

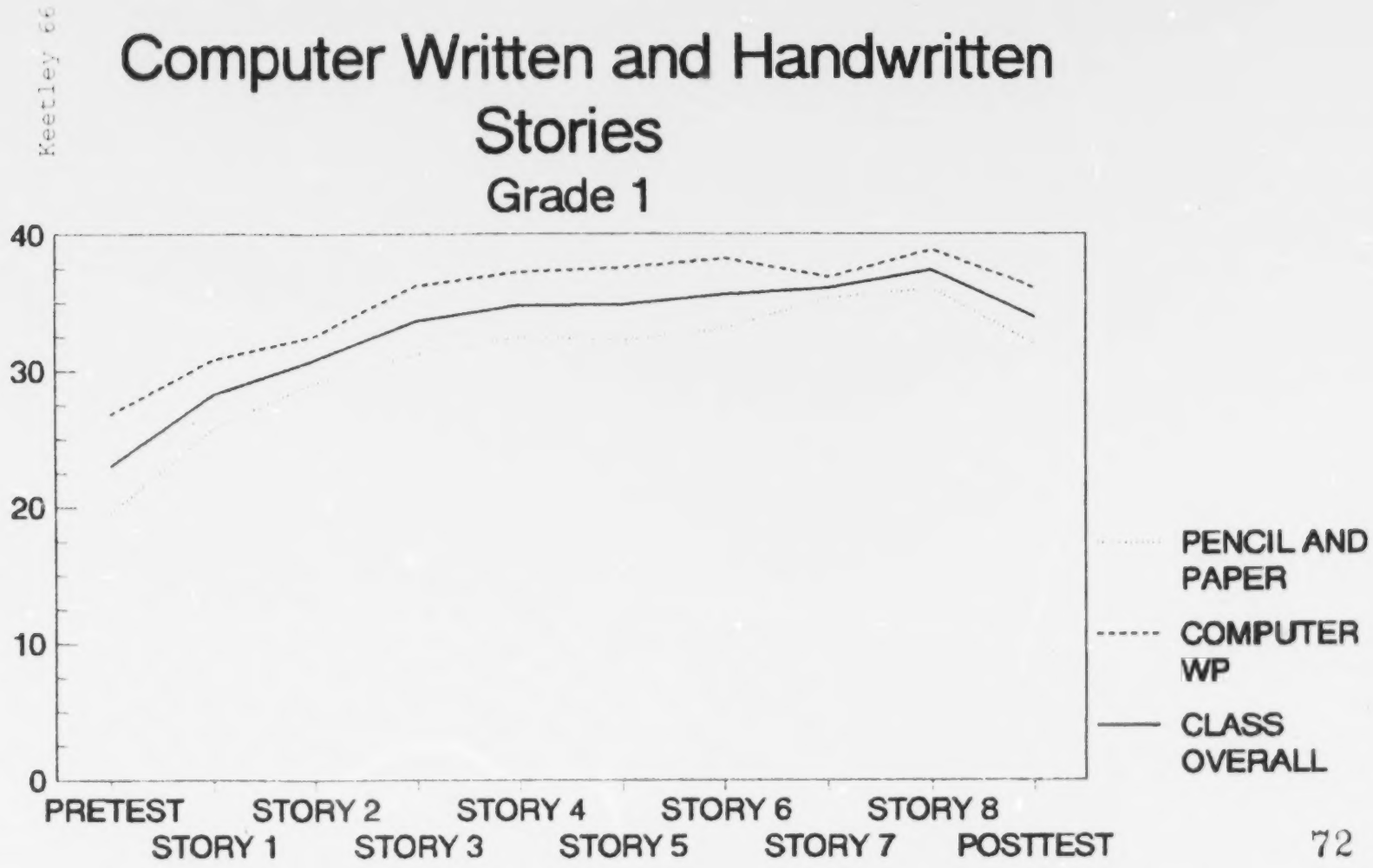
Keetley 88
Computer Written and Handwritten Stories
Grade 1
40
30
20
10
0
PRETEST
STORY 1
STORY 2
STORY 3
STORY 4
STORY 5
STORY 6
STORY 7
STORY 8
POSTTEST
PENCIL AND PAPER
COMPUTER WP
CLASS OVERALL

Figure 1

for story writing. Butler and Cox (1990) found that the first graders did a lot more re-reading of the text on the computer monitor and further that the integration of the computer as a word processor "enhances the achievement of the children." Keuchle (1990) found that students using the computer as a word processor scored higher than students using paper and pencil. Keuchle (1990) also found that the computer stories were longer and more detailed. Michigan University (1989) found that first graders preferred using the computer to paper and pencil. The students particularly spoke of the aesthetic quality of the final product as well as the effectiveness of the use of the computer for revisions. Mavrogenes, Hagemann, and Wallace (1987-1988) found that teachers need to encourage creativity in their students when writing. Some of the best stories written during this research were ones that the students were asked to use their imaginations and to be as creative as possible. Martin (1994) found that the use of the computer has been an effective tool for the students to use with their process writing as the drudgery of writing with pencil and paper is removed. Cheever (1987) found that fourth

graders also expressed preference to using the computer in this endeavor.

Moreover, as stated in the Mehlville R-9 School District's Language Arts through Language Experience: An Elementary Curriculum Guide (1983), students learn to write by writing. The more the students write, the better their skills become. This research does illustrate that these students' process story writing skills did improve with the amount of writing they achieved throughout this research.

The results of the Retrospective pretest indicate that the computer skills that the students have may have acquired outside of school have not significantly affected their performance during this study.

Discussion

The students that used the computer and the word processing software The Children's Writing and Publishing Center (The Learning Company, 1990) for story writing scored higher and wrote longer stories with more detail than the students that used paper and pencil. This was observed by the evaluators during the

assessment process. The experimental group scored significantly higher in slightly more that half of the stories written.

After this study concluded and the groups were switched to allow the control group the opportunity to use the computer and the word processing software The Children's Writing and Publishing Center (The Learning Company, 1990) for their stories, many of the students voluntarily commented and expressed orally to the classroom teacher, during the revision stages of process writing, their preference to using the computer as a word processor for process writing. The remaining students that did not offer this information were asked their preference and rationales by the classroom teacher during their revision process. Their responses support what Allen (1986) and her fifth graders suggest are good reasons for using the computers as a word processor for process writing. All 23 students expressed preference in using the computer in this endeavor and offered the following explanations and justifications:

1. easier revisions
2. hands didn't get tired

3. monitor allows for easier re-reading
4. aesthetic quality
5. chance to use the computers
6. peer collaboration at the computers is an enjoyable educational experience
7. much quicker process

The students in the experimental group did write longer and more detailed stories and showed more enthusiasm for writing as it was not considered a chore, especially in the revision stage. This is reflected in the fact that the experimental group scored higher in all eight stories.

Recommendations

Educational implications for elementary students and teachers exist that should not be ignored although, through ANCOVA, statistical significance was not achieved. Students' writing on the computer was of higher quality than those on pencil and paper. These stories were longer and more detailed. Process story writing on the computer was more enjoyable for the students.

All of this is encouraging and this utilization of computers should be viewed as one method of incorporating computers into the curriculum. Furthermore, this study shows that the use of the computer for process story writing enhanced the quality of the students' story writing abilities as the experimental group consistently scored higher on all eight stories. This study certainly shows the justification for using the computer as a word processor for process story writing. Furthermore, school departments can look at the computer as an educationally sound investment. Moreover, achievement scores could be positively affected.

Using the computer as a word processor created more enthusiasm among the students for story writing. These students truly enjoyed their story writing and were quite proud of their finished product. Furthermore, the peer collaboration that occurred at the computers must definitely be viewed as an asset.

More specifically, the following recommendations are presented and offered as suggestions for further

study:

1. research on the re-reading process of story writing
2. process writing research using word processing software containing spell check
3. similar study conducted for a longer period of time in order to switch the two groups for further analysis and comparison
4. replication of this study in another first grade and/or another elementary grade.

References

Allen, A. (1986). The computer, cooperative learning and the California writing project, pp. 21-23. In S. Franklin & J. Madian (Eds.), The Writing Notebook: Creative word processing in the classroom. Eugene, OR: The Writing Notebook: Creative Word Processing in the Classroom, Editorial Offices.

Anderson-Inman, L. (1986, November). The reading-writing connection: Classroom applications for the computer, part 1, pp. 27-31. In R. Boone (Ed.), Teaching process writing with computers. (re.ed.) Eugene, OR: International Society for Technology in Education.

Balajthy, E., McKeveny, R., & Lacitignola, L. (1986-1987, December/January). Microcomputers and the improvement of revision skills, pp. 3-6. In R. Boone (Ed.), Teaching process writing with computers. (re.ed.) Eugene, OR: International Society for Technology in Education.

Butler, S. & Cox, B. (1990). Writing with a microcomputer in grade one: A study in collaboration. Canada: Vancouver, British Columbia, pp. 3-23.

Caster, T. (1983, January). The use and effectiveness of computers in the elementary classroom (pp.3-17). Proceedings of the Annual Study Conference of the Georgia Association for Childhood Education International. Athens, GA: Georgia Association for Childhood Education International.

Cheever, M. (1987). The effect of word processing on the acquisition of composition skills by elementary students. pp. 38-40. In The role of the computer in education. Proceedings of the Annual Meeting of Micro-Ideas. Glenview, IL: Micro-Ideas.

Chicago Board of Education, (1981). Curriculum guide in communication arts for the elementary school in listening, speaking, and writing: grade one, levels CD, ix-xv, 138-216. Author.

Cochran-Smith, M. (1991, Spring). Word processing and writing in elementary classrooms: A critical review of related literature. Review of Educational Research, 61 (1), pp. 107-155.

Color Me. (1985). <Computer program> Mindscape.

Costanzo, W.(1989). The electronic text learning to write, read, and reason with computers. Englewood Cliffs, NJ: Educational Technology, pp. 87-127.

Dalton, B., Morocco, C., & Neale, A. (1988, April). "I've lost my story!" Integrating word processing with writing instruction (pp. 3-20). Proceedings of the American Educational Research Association Annual Meeting. New Orleans, LA: American Educational Research Association.

Ferrara, J. (1990). Trends in elementary writing instruction in the 1980's, pp. 3-30.

Fleury, B. (1988). Computers and teaching writing: What do "they" say about it?, pp. 16-17. In Franklin, S. (Ed.), Making the literature, writing, word processing connection: The best of the Writing Notebook, (2nd ed.) Eugene, OR.

Guddemi, M. & Fite, K. (1991, January). Is there a legitimate role for computers in early childhood programs? (pp. 2-7). Proceedings of the Annual Meeting of the National Association for the Education of Young Children. Washington, D.C.: National Association for the Education of Young Children.

Gunn, C. (1989, January/February). Writing related research: A review of the literature, pp. 45-48. In R. Boone (Ed.), Teaching process writing with computers. (re.ed.) Eugene, OR: International Society for Technology in Education.

Hayley-James, S., Stewig, J., Ballenger, M., Chapparo, J., Millett, N., Terry, C., & Shane, J. (1988). Houghton Mifflin English Level One. Boston: Houghton Mifflin.

Herron, J. (1992, January/February). Computer writing labs: A new vision for elementary writing. The Writing Notebook, 9 (3), 31-33.

Huck, S., Cormier, W., & Bounds, W. (1974). Reading-Statistics and Research. Harper and Row: New York.

Kahn, J. (1987, June). Learning to write with a new tool: Young children and word processing, pp. 15-17. In R. Boone (Ed.), Teaching process writing with computers. (re.ed.) Eugene, OR: International Society for Technology in Education.

Kidwriter. <Computer program> Cambridge, MA: Spinnaker Software.

Kromhout, O. & Butzin, S. (1993, Fall). Integrating computers into the elementary school curriculum: An evaluation of nine Project CHILD model schools. Journal of Research on Computing in Education, 26 (1), 55-69.

Kuechle, N. (1990, August/September). Computers and first grade writing: A learning center approach, pp.49-52. In R. Boone (Ed.), Teaching process writing with computers. (re.ed.) Eugene, OR: International Society for Technology in Education.

Leonardi, E. & McDonald, J.(1986, April). Assessing our assumptions, pp. 7-9. In R. Boone (Ed.), Teaching process writing with computers. (re.ed.) Eugene, OR: International Society for Technology in Education.

Madian, J. (1986, Novemeber/December). Writing skills with WriteOn!, pp. 83-84. In R. Boone, (Ed.), Teaching process writing with computers. (re.ed.) Eugene, OR: International Society for Technology in Education.

Magic Slate. (1984). <Computer program> Pleasantville, NY: Sunburst Communication.

Martin, L. (1994, February). Computers and process writing in an integrated curriculum. The Computing Teacher, pp. 36-37.

Mavrogenes, N., Hagemann, M., & Wallace, T. (1989). A comparative study of three methods of promoting literacy in Kindergarten and First Grade. Chicago: Chicago Public Schools, pp. v-ix, 1-23.

Mehlville R-9 School District (1983). Language arts through language experience: An elementary curriculum guide, pp. 1-12. Author.

Merrimack Education Center (1986). Technology in the curriculum, pp. 7, 12-13, 19-21, 28. Author.

Merrimack School District (1986). Language arts curriculum guide, pp. iii-vi, 8-13. Author.

Murray, J., Lines, E., & Sprumont, B. (1986). Word processing in elementary schools: seven case studies. Education and Technology Series. Toronto: Ontario Department of Education, pp. 1-4, 42-43.

NAEP Trends show Students Virtually at a Standstill. (1994, August 17). Report on Education Research, 26, (1), pp.1,3.

Neuman, S. & Cobb-Morocco, C. (1986-1987 December/ January). Writing with word processors for remedial students, pp. 19-22. In R. Boone, (Ed.), Teaching process writing with computers. (re.ed.) Eugene, OR: International Society for Technology in Education.

Neuwirth, C., Haas, C., & Hayes, J. (1990). Does word processing improve students' writing? A critical appraisal and assessment. Pittsburgh, PA: Carnigie Mellon University, pp. 1-17.

New York City Board of Education (1984). Now we are six: A guide to teaching first grade, pp. 3-5, 64-66, 121-122, 167, 231-247, 273-280, 303-308. Author.

Olson, K. & Johnston, J. (1989, September). The use of the computer as a writing tool in a Kindergarten and First Grade classroom. CIEL pilot year final report, part 2. Ann Arbor, MI: Michigan University Institute for Social Research and Michigan University School of Education, pp. 1-71.

Olson, M. (Ed). (1990). Opening the door to classroom research. Newark, DE: International Reading Association, pp. ix-x.

Ornstein, A. & Levine, D. (1989). Foundations of Education. (4th ed.) Boston: Houghton Mifflin, pp. 147-149.

Pohl, V. & Groome, D. (1994, February). Happy hands: Pre-keyboarding facility for emergent writers. The Computing Teacher, pp. 16-18.

Pulaski, M. (1971). Understanding Piaget. New York: Harper & Row.

Ritter, J. (1991). Peer conferencing, computers, and persuasive writing: A recipe to encourage revision. Proceedings of the 6th annual summer conference Extending the Human Mind: Computers in Education. Eugene, OR: The Center for Advanced Technology in Education, pp. 11-14. In R. Boone (Ed.), Teaching process writing with computers. (re.ed.) Eugene, OR: International Society for Technology in Education.

Rodgers, R. (1991). Elementary computer labs that integrate curriculum (pp. 1-14). Proceedings of the annual conference of the National Council of States on Inservice Education. Houston, TX: National Council of States on Inservice Education.

Santa, C. (1990). Teaching as research, pp. 64-76. In M. Olson (Ed.), Opening the door to classroom research. Newark, DE: International Reading Association.

Schaeffer, E., (1987). Teaching writing with the microcomputer. Fastback 254. Bloomington, IN: Phi Delta Kappa Educational Foundation, pp. 7-38.

Stickybear Typing. (1987). <Computer program> Norfolk, CT: Optimum Resource.

The Children's Writing and Publishing Center. (1990). Vers. 1.0N <Computer program> Fremont, CA: The Learning Company. (IBM Network Version).

Thomas, I., (1985). Uses of the computer in teaching the composing process, pp. 1-2. In S. Franklin & J. Madian (Eds.) The Writing Notebook: Creative word processing in the classroom. Eugene, OR: The Writing Notebook: Creative Word Processing in the Classroom, Editorial Offices.

Tolman, M.,& Allred, R. (1991). The computer and education. What research says to the teacher. (2nd ed.), pp. 14-17, 21.

United States: Office of Educational Research and Improvement. U.S. Department of Education(1994) NAEP 1992 trends in academic progress. Washington, DC: Government Printing Office.

Wachob, R. (1993, May). Young minds soar with technology. The Computing Teacher, pp. 53-55.

White, H.(1992, Special issue). Linking learning with technology: The teaching and learning with computers model. Curriculum Product News, pp. 2-3.

Whitmer, J. & Miller, M. (1987, September). The effects of writing on reading abilities: A comparison of first grade writing programs with and without computer technology (pp. 31-35). Proceedings of the 18th Annual Reading Conference. Greeley, CO: Annual Reading Conference.

Wresch, W. (1988, April). Six directions for computer analysis of student writing, pp. 39-43. In R. Boone (Ed.), Teaching process writing with computers. (re.ed.) Eugene, OR: International Society for Technology in Education.

Writing to Read. <Computer program> Atlanta: GA IBM.

APPENDICES

APPENDIX A

HOYLE ELEMENTARY SCHOOL

70 COMMUNITY LANE · SWANSEA, MA 02777 · 508-679-4049

M. D. Zagorski, Principal

December 19, 1994

Dear Parent(s),

I am presently enrolled in a graduate program at Johnson and Wales University. In conjunction with this, I will be conducting educational research with the class from January 3 - March 3, 1995.

The research will look at the effects that the computer (word processing) has on process story writing in grade one. The students will be randomly divided into two groups-one will use the computer to write their stories and the other group will use paper and pencil.

All students in the class will continue to use the computer in other academic areas during this time. Please be assured that all students will eventually have equal time on the computer for story writing after March 3.

The results of this research will be available at the end of May and will be shared with the school department at that time.

If you have any further questions, please do not hesitate to contact me at Hoyle School.

Sincerely,

Elizabeth D. Keetley

Elizabeth D. Keetley

M. D. Zagorski

MISSION: At the Hoyle School every child will be given the opportunity to develop to his or her full potential of social, emotional, physical and academic abilities so that he or she may become well integrated members of society.

APPENDIX B

EVALUATION SHEET

Name:_____ **Story #** _____

1= poor 2= below average 3=average 4=above average 5=excellent

Outcome: *The students will demonstrate their ability to express their thoughts and ideas in written form .*

1. Content and theme appropriate to lesson 1 2 3 4 5

2. Creative thinking 1 2 3 4 5

3. Expression of ideas-clear, logical, sequential 1 2 3 4 5

Outcome: *The students will have the knowledge and skills to apply the mechanics of writing appropriate for first grade by writing stories either on a computer word processor or using pencil and paper.*

1. Sentence structure 1 2 3 4 5

2. Capitalization 1 2 3 4 5

3. Punctuation 1 2 3 4 5

4. Grammar 1 2 3 4 5

5. Spelling (high frequency words) 1 2 3 4 5

TOTAL SCORE:_____

APPENDIX C

These are the topics which the students wrote stories on during this study:

Pre-test: Winter Fun

Story #1: Penguins

Story #2: Animal Tracks

Story #3: Hat or Hat and Mittens

Story #4: Making Soup

Story #5: If I Had 100 Dollars. . .

Story #6: My Lost Tooth

Story #7: My Favorite Bear

Story #8: The Day It Rained...

APPENDIX D

These are the Retrospective pretest questions that the students were asked:

1. Do you have a computer at home?

2. Outside of school, do you practice keyboarding on a computer?

3. Outside of school, do you play games on a computer?